**Cloud Computing – Advantages, Disadvantages, & Risks**

Larry A. Spickard – this can be located at my technology survival wiki found at URL <http://spickardchemistry.wikispaces.com/>

Cloud computing provides a step-change in education computer technology to achieve increased computer power, reduced costs, increased productivity, reliability and opportunities for additional collaboration between users. The net impact of this technology is to achieve improved results with learning outcome at a lower cost while managing unique security risks.

There are several positive impacts within the educational environment with cloud computing. Specifically there is a reduction in the purchased equipment and maintenance costs as individual servers are no longer required at the machine/school level but centralized with the could infrastructure. On-going needs for additional computing power and storage are minimized as increased requirements are drawn at the cloud level as needed without incremental investment required at the user level. The incremental costs to upgrade for these requirements are less to the user and only incurred on an as-needed basis. If requirements are reduced in the future the cost to the user is also reduced. Hardware requirements are simplified to devices which only require internet on-line searching capabilities such as Chromebooks which are less expensive to purchase and maintain than full personal portable computers. School and school district technology and maintenance costs are reduced through standardization on one hardware and software platform. Focus can shift form supporting multiple tools and platforms to more effective utilization, standardized troubleshooting, and best practices for optimizing utilization.

Reliability is a key feature of cloud computing. Software back-ups occur consistently and seamlessly at a higher level of reliability than a typical individual user performs and they are done with best practices that do not impact productivity time to users. This achieves a net higher level of system reliability with less impact than what an individual user could achieve on their own.

The advantages of integrating cloud computing into the classroom curriculum far outweigh the disadvantages. Cloud computing is an enabler to use broad integrated platform tools associated with Google for example, which open up the use of significantly new tools and teaching strategies to increase achievement of learning objectives. Access to specific tools such as word processors, spreadsheets, presentation software, email, blogging sites, customized internet sites, knowledge-expert sites, learning video sites, note-taking sites, drawing sites, geography sites, maps, and integrated readers are all available through cloud computing. These create additional learning tools which are integrated in a productive way so the student can learn how to apply them more effectively and integrate them without having to learn many different tools and how to integrate them. Work is automatically saved and retained at the cloud level providing more flexible access from different devices. Since files are updated and saved remotely, they may also be retrieved and updated real time by multiple users. This provide the opportunity to collaborate and share ideas between different users creating more robust knowledge points with less bias reflecting the input from different views and expertise. The disadvantages of integrating cloud technology to the curriculum are associated with the learning curve of the change from traditional individual computing to the cloud technology as well as learning the breadth of tools and scope individual software tools available. These disadvantages are quickly outweighed through available learning products which make the transition easier. The change to cloud technology appears to be very sustainable and long term. Investment of time and energy to learn the technology will not be lost and incremental changes can be followed effectively. Users making an investment to learn the technology can proceed in depth to fully exploit capabilities and continue to get a return on their time. Overall, the advantages of introducing cloud computing create an evergreen set of opportunities to improve curriculum, achieve higher learning objectives, and are supported with effective tools to integrate the technology quickly.

There are legitimate potentially new security concerns which accompany cloud computing. What applications are being accessed, what information is being shared, with who, etc. With an inherently more open access to applications among broader groups there are security issues to be aware of. Countering this, the cloud service providers typically have more security resources than an individual school or district can maintain. With an effort to standardize on applications within a platform for example, one can actually achieve a risk exposure to the total number and type of applications need to evaluate, assess and monitor by IT department resources. There should be an appropriate shift in emphasis by IT resources to ensure the applications we do use have strong individual checks, passwords and controls and that there is clear visibility on who is accessing and sharing information through specific applications. With the security risks and potential cloud controls in mind the security risks are manageable.

In summary, cloud computing offers significant potential benefits in terms of improved productivity, costs and achieving higher learning objectives. There are both short term and longer tem benefits. While there are implementation challenges and new security considerations to be aware of there are effective ways to deal with these challenges and concerns.